USER'S MANUAL

PowerScout 3™

PowerScout 18™

ViewPoint™

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PowerScout™

SAFETY SUMMARY and SPECIFICATIONS

This general safety information is to be used by both the Logger operator and servicing personnel. DENT Instruments, Inc. assumes no liability for user's failure to comply with these safety guidelines.

Conforms to UL Std 61010-1
Certified to CSA Std C22.2 No. 61010-1

The PowerScout™ is an Over-Voltage Category III device.

CAUTION: This METER may contain life threatening voltages. QUALIFIED PERSONNEL MUST Disconnect all high voltage wiring before USING or servicing the METER.

Warning: Use of this device in a manner for which it is not intended may impair its means of protection.

SYMBOLS ON EQUIPMENT

Denotes caution. See manual for a description of the meanings.

When connecting the PowerScout™ to an AC load, follow these steps in sequence to prevent a shock hazard.

1. De-energize the circuit to be monitored.
2. Connect the CTs to the phases being monitored.
3. Connect the voltage leads to the different phases. Use proper safety equipment (gloves and protective clothing) as required for the voltages monitored.

Denotes high voltage. risk of electric shock. Life threatening voltages may be present. Qualified personnel only.

DO NOT EXCEED 600V. This meter is equipped to monitor loads up to 600V. Exceeding this voltage will cause damage to the meter and danger to the user. Always use a Potential Transformer (PT) for loads in excess of 600V. The PowerScout is a 600 Volt Over Voltage Category III device.

USE ONLY CURRENT TRANSFORMERS (CTs) SUPPLIED.
Do not use other CTs. A serious shock hazard and meter damage can occur if other CTs are used.

Equipment protected throughout by double insulation (IEC 536 Class II)

No accessories are approved for use with the PowerScout™ other than those specified in the DENT Instruments product literature and price sheets.

If the Meter appears damaged or defective, first disconnect all power to the meter. Then please call 541.388.4774, or email tech support (techhelp@dentinstruments.com), for assistance.

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PowerScout™

RÉSUMÉ DE SÉCURITÉ ET SPÉCIFICATIONS

Cette information de sécurité est destinée à être utilisée à la fois par l'opérateur de l'enregistreur et le personnel de service. DENT Instruments, Inc n'assume aucune responsabilité pour l'utilisateur qui ne respecte pas les directives en matière de sécurité.

Conforme à UL Std 61010-1
Certifié CSA Std C22.2 No. 61010-1

Le PowerScout ™ est un appareil de surtension de catégorie III.

ATTENTION: Ce METER peut contenir de hautes tensions qui peuvent être dangereuses. UN PERSONNEL QUALIFIÉ DOIT débrancher tous les câbles à haute tension avant d'utiliser ou de réparer du METER.

Attention: L'utilisation de cet appareil d'une manière pour laquelle il n'est pas destiné peut annuler ses moyens de protection.

SYMBOLES DES EQUIPEMENTS

Signifie prudence. Voir le manuel pour une description de la signification.

En faisant la connexion du PowerScout ™ à une prise de courant alternatif, suivez ces étapes en ordre pour empêcher un risque de choc.

1. Décharger le circuit à contrôler.
2. Connectez le TC aux phases à surveiller.
3. Connectez les fils de tension à des phases différentes. Utiliser des équipements de sécurité (gants et des vêtements de protection) qui sont nécessaires pour les tensions surveillées.

Indique haute tension. Risque de choc électrique. Hautes tensions peuvent être présentes qui mettent la vie en danger. Personnel qualifié uniquement.

NE PAS DEPASSER 600V. Ce compteur peut contrôler les charges jusqu'à 600V. Le dépassement de cette tension peut causer des dommages à l'appareil et du danger pour l'utilisateur. Utiliser toujours le potentiel transformateur (PT) pour des charges de plus de 600V. Le PowerScout est un appareil à 600 V de surtension de catégorie III.

UTILISEZ SEULEMENT TRANSFORMATEURS DE COURANT (TC) FOURNIS.
Ne pas utiliser d'autres TC. Un sérieux risque de choc et de dommages au compteur peut se produire si d'autres TC sont utilisés.

L'équipement protégé en double isolation (IEC 536 Classe II)

Pas d'accessoires approuvés pour une utilisation avec le PowerScout ™ sauf ceux spécifiés par DENT Instruments dans ses documentations sur les produits et également sur les prix.

Si le compteur semble endommagé ou défectueux, tout d'abord déconnecter le pouvoir de l'appareil. Alors s'il vous plaît appelez 541.388.4774 ou contacter par courriel l'assistance technique (techhelp@dentinstruments.com), pour obtenir de l'aide.

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SECTION I: INTRODUCTION

Using this Manual

This manual contains information about the PowerScout™ 3, PowerScout™ 18, ViewPoint Software and the RS-422/485 to Serial Adapter. For ease of use, this manual has been divided into five sections. The list of sections and their contents follows:

Section I	Introduction
Section II	The PowerScout™
Section III	ViewPoint™ Software
Section IV	Configuring the RS-422/485 Adapter
Section V	Appendix

PowerScout Overview

The PowerScout™ watt-transducers are made for the non-revenue submetering market. Each meter is made to monitor the voltage, current, power and energy of a single three phase system. The PowerScout™ meter uses direct connections to each phase of the voltage, and uses current transformers (or Rogowski coils) to monitor each phase of the current. Energy, demand, power factor, line frequency, etc. are derived from the voltage and current inputs.

The communication interface to the unit is through an RS-422/485 serial connection that uses the Modbus protocol for sending commands and retrieving data. A separate remote terminal unit (RTU), Data Logger, or Building Management and Control System is usually connected to the PowerScout to provide for data recording and trend logging and any human interface or display.

Up to 41 PowerScout™ 18 meters (249 PowerScout™ 3 meters) may be connected to a single RTU for monitoring and recording power usage at multiple locations within a single site.

The PowerScout™ 18 (PS18) consists of six independent three phase metering elements labeled “A” through “F” in the drawing below. Each metering element has provision for three current transformers (CTs), one for each phase. In this way, the PowerScout™ 18 can measure six independent three-phase loads.

The voltage reference is made on the power supply board as shown below. The single connection point for the voltages is common to all six of the watt metering elements. Therefore, though six independent three phase loads can be monitored by a single PowerScout™ 18 all six loads must have the same voltage source, e.g., be in the same panel. To monitor multiple voltage sources, for example, 480/277V and 208/120V loads across a transformer, two PowerScout™ 18’s will be needed, one for each voltage source.

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SECTION II: THE POWERSCOUT™

PowerScout Technical Specifications

Service Type	Three Phase, Four Wire (WYE)
3 Voltage Channels	CATIII 80-346 Volts AC Line-to-Neutral, 600V Line-to-Line
Current Channels	
PS3	3 channels 0-5,000+ Amps depending on current transformer
PS18	18 channels 0-5,000+ Amps depending on current transformer
Measurement Type	True RMS using high-speed digital signal processing (DSP)
Line Frequency	50/60Hz, DC
Waveform Sampling	13 kHz
Measurements	Volts, Amps, kW, kWh, kVAR, kVARh, kVA, kVAh, Apparent Power Factor (aPF), Displacement Power Factor (dPF). All parameters for each phase and for system total.
Accuracy	Better Than 1% (<0.5% typical) for V, A, kW, kVAR, kVA, PF
Resolution	1 Amp, 1 Volt, 1 watt, 1 VAR, 1 VA, 0.01 Power Factor Depending on scaling setting
Indicators	24 bi-color LEDs (red and green): 4 LEDs per each watt metering element. Each element has 1 LED to indicate communication and 3 LEDs for correct phasing (Green when voltage and current on the on the same phase; Red when incorrectly wired. Patent pending.)
Communication	
Direct	Modbus over RS-485
Modbus Framing	RTU (binary)
Communication Rate	9600 baud
Data Bits	8
Parity	None
Stop Bit	1
Data Formats	Modbus Protocol
Power	From L1 Phase to L2 Phase. PS 18: 5 Watts typ. @ 600VAC, 2.5W typ. @ 80VAC; non-user replaceable .5 Amp Internal fuse protection
Mechanical	
Operating Temperature	-7 to + 60 ^{O}C (20 to 140 ^{O}F)
Humidity	5% to 95% non-condensing
Enclosure	Optional NEMA 4 rated, ABS plastic, 94-V0 Flammability Rating
Weight	0.4 kg (11 ounces) Exclusive of CTs
Dimensions	Approx. 6” X 10” (15 X 25 cm) Circuit Board Only, PowerScout 18

ViewPoint™ Minimum System Requirements

Operating System	Windows® 7 (32 or 64 bit), Vista (32 or 64 bit), XP or 2000
Communications Port	One USB Port or Serial Port
Hard Drive	50 MB minimum available
Processor	Pentium Class 1 GHz or more recommended

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Connections To The PowerScout™

The PowerScout™ has a connector for four voltage wire leads for making connections to voltage sources (L1, L2, L3, Neutral). The PowerScout™ 18 also has connectors for up to 18 current transducers (CTs) (PowerScout™ 3 has 3 CTs). The PowerScout™ also has a three wire connector for the RS-485 Modbus link.

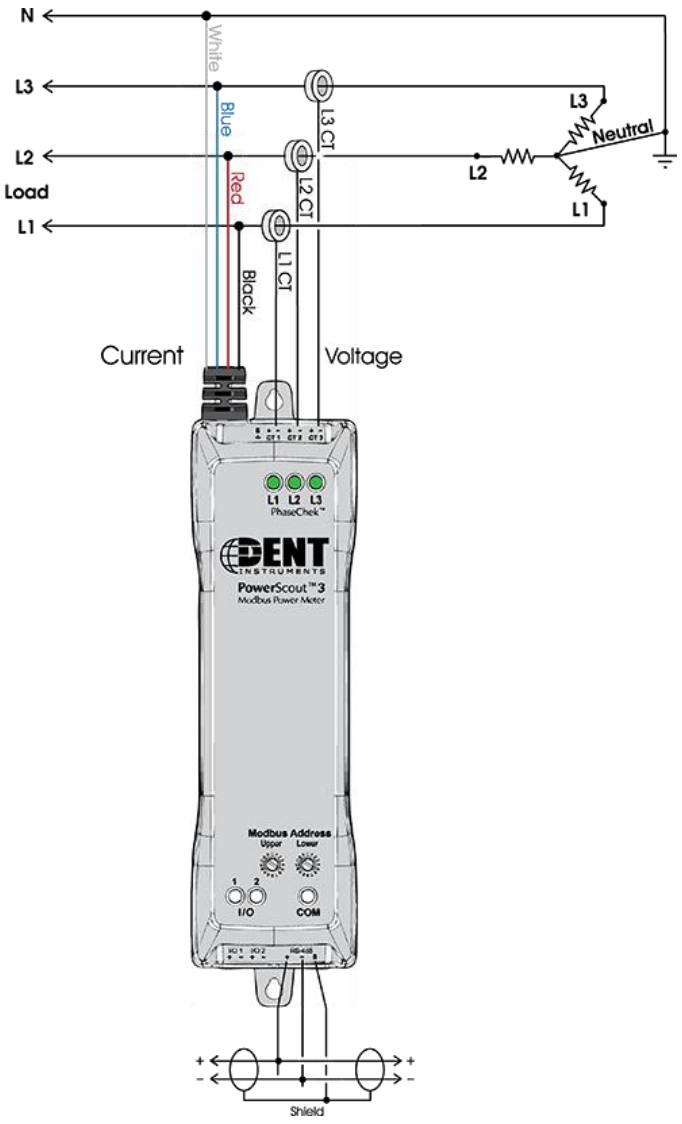
CAUTION: THE POWERSCOUT™ SHOULD ONLY BE WIRED BY QUALIFIED PERSONNEL. HAZARDOUS VOLTAGES EXIST.

ATTENTION: LE POWERSCOUT ™ NE DOIT ÊTRE BRANCHÉ QUE PAR UN PERSONNEL QUALIFIÉ. TENSIONS DANGEREUSES SONT PRÉSENTES.

DANGER! THE UNENCLOSED POWERSCOUT BOARD REQUIRES EXTRA CAUTION WHEN CONNECTING. LIFE THREATENING VOLTAGES EXCEEDING 600 VOLTS MAY EXIST ON THE BOARD. THE RISK OF SERIOUS INJURY OR DEATH SHOULD NOT BE UNDERESTIMATED.

DANGER! LA PLAQUETTE DE CIRCUITS IMPRIMÉS SANS COUVERCLE EXIGE UN REDOUBLEMENT DE PRUDENCE QUAND ON FAIT LA CONNEXION. LES TENSIONS DÉPASSANT 600 VOLTS PEUVENT EXISTER SUR LA PLAQUETTE ET PEUVENT METTRE LA VIE EN DANGER. LE RISQUE DE BLESSURES GRAVES OU DE MORT NE DOIT PAS ÊTRE SOUS-ESTIMÉ.

Connecting the PowerScout™ 3



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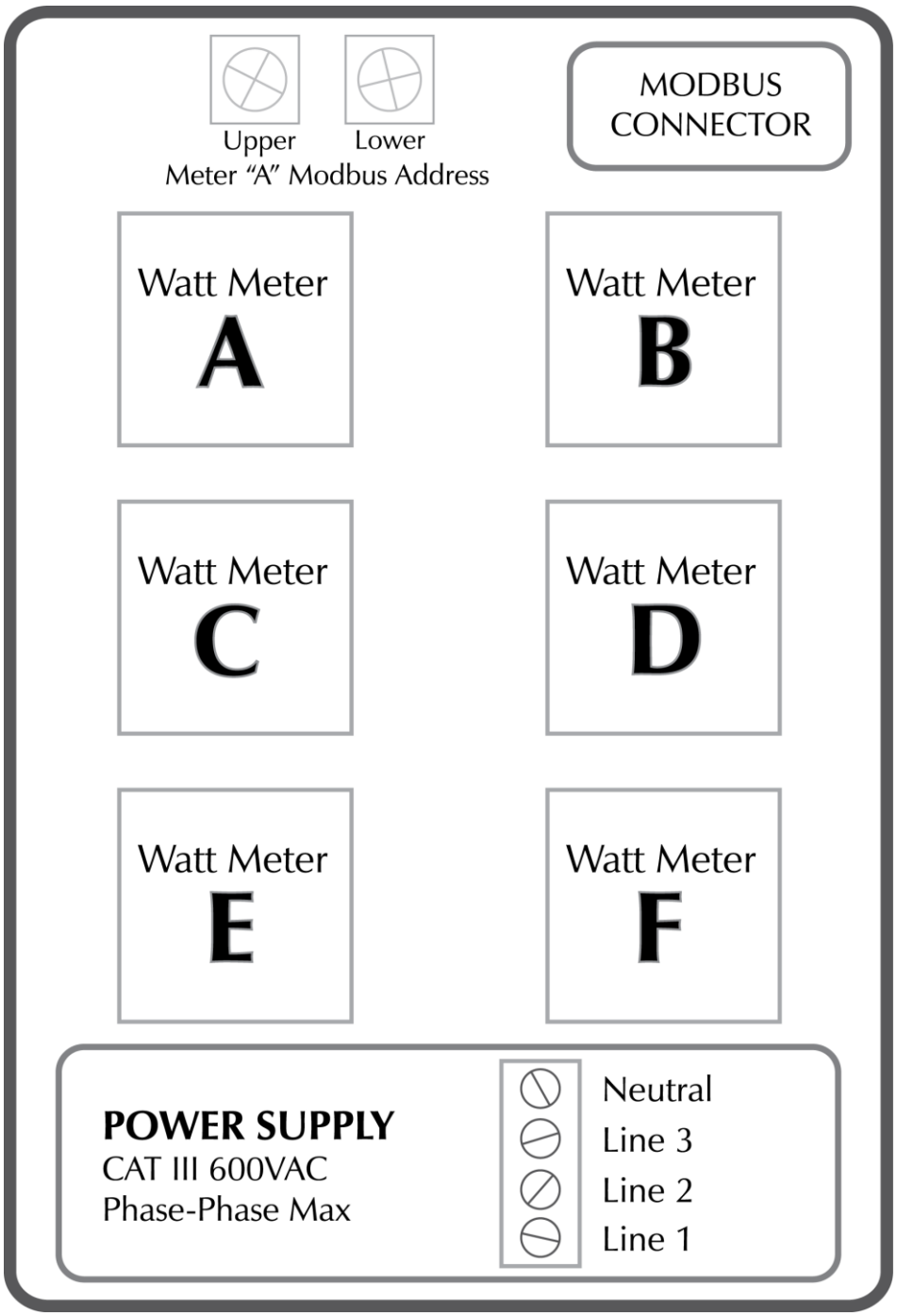
PowerScout™ 18
Layout and Watt-Transducer Naming Convention



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WARNING! REMOVE THE METER FROM ALL SOURCES OF VOLTAGE BEFORE MOUNTING!

Mounting the PowerScout 3

The PowerScout™ 3 must be installed in an approved electrical panel or enclosure using proper installation practices according to the local electrical codes. For convenience of mounting, two mounting tabs are provided on the PowerScout™ 3.

Mounting the PowerScout 18

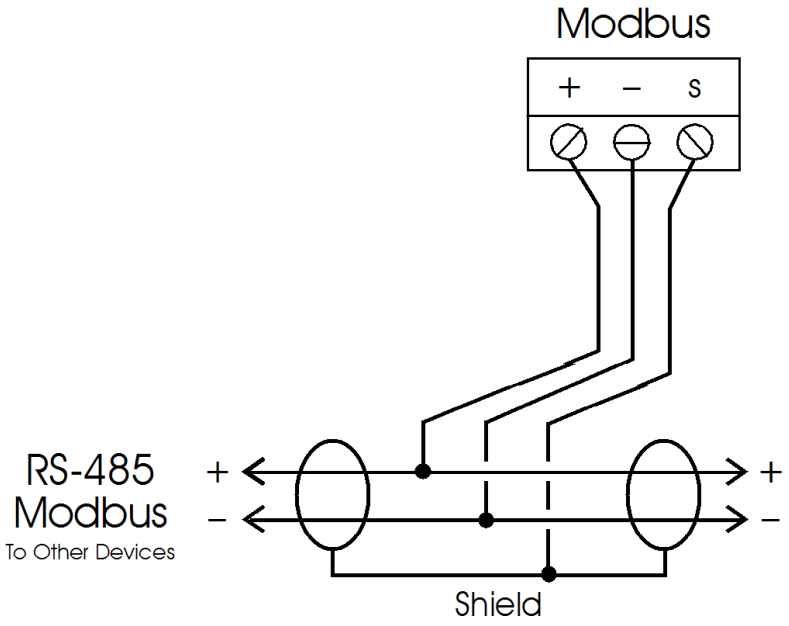
Open the top cover of the case to expose four (.275"/ 7mm) mounting holes, one at each corner. Using the appropriate screw for the material that the PowerScout™ will be mounted to, screw the case to the mounting surface. The location you mount the case must be able to support at least 3 lbs.

Wiring the Modbus

For the PowerScout™ 18 only, open the top cover of the case (if so equipped) by turning the two corner screws counter-clockwise until loose. Set two rotary switches (on the circuit board near to the Modbus/RS-485 connector) to the Modbus address desired. These switches (on both the PowerScout™ 3 and PowerScout™ 18) set the address for metering element "A." Metering elements "B" through "F" will always have a Modbus address that is one higher than the element before. For example, if the rotary address switches are set to 01 then metering element "A" register values will be accessed at Modbus address 01, metering element "B" registers will be accessed at Modbus address 02, "C" at address 03, and so on.

On the PowerScout™ 3 and PowerScout™ 18, the rotary switches are 16 position hexadecimal switches. The default factory setting is hex 01 (Modbus Address Decimal 01). 254 different Modbus addresses are allowed from 01 (hex 01) to decimal 254 (hex FE). Addresses hex 00 (Decimal 00) and hex FB through hex FF (Decimal 251 through 255) are reserved for factory use. (See Appendix A for a decimal to hex conversion, if your equipment is decimal based.) Each PowerScout™ 18 uses 6 Modbus address.

Next connect the Modbus wires to the connector in the meter. Use Diagram below.



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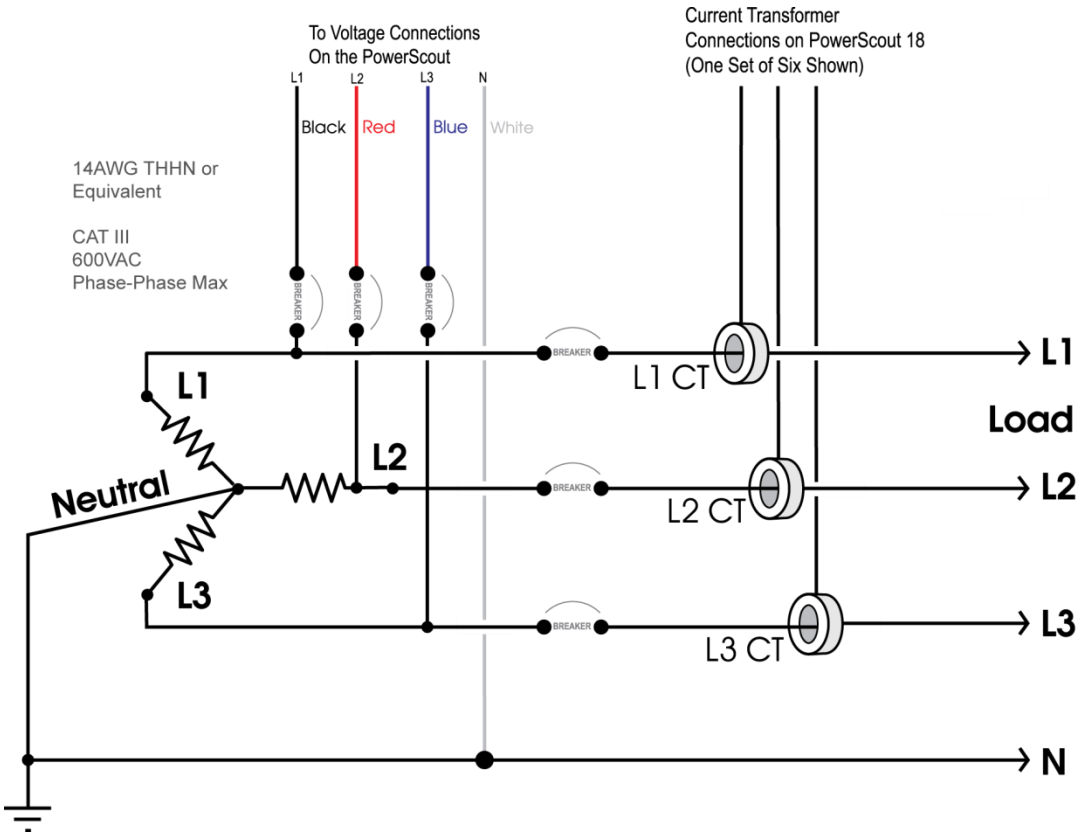
Wiring of the CT's:
For each of the six 3-phase metering elements A through F, connect the current transformers as shown in the diagram below.



Note: The CTs are insensitive to orientation and may be placed on the wires to be monitored with the CT faces in either direction. The CTs are connected on the PowerScout™ board in positions labeled L1, L2, L3 and must be placed on the phase wires of the load to be monitored corresponding to the phase of the voltage leads. i.e., The CT labeled L1 must be placed on L1 phase voltage wire, the L2 CT must be on the L2 voltage, and the L3 CT on the L3 voltage.

Wiring of the Voltage Input:
Last, connect 14 AWG THHN (or equivalent) wires to the PowerScout™ CAT III voltage terminals as shown in the diagram above after a building installed dedicated circuit disconnect breaker while being as close as possible to it (following the local electrical codes). Mark the breaker as the disconnect for the PowerScout™. Note that the PowerScout™ has an internal non-user replaceable .5 Amp Internal fuse protection.

Warning: DO NOT EXCEED 600Vac PHASE TO PHASE CAT III. When complete, close the enclosure cover, if equipped.

Attention: NE PAS DÉPASSER UNE PHASE À 600VAC CAT III. Une fois terminé, fermer le covercle, s'il y en a un.

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Powering the PowerScout™ 3 and 18

The PowerScout™ instruments are self-powered from the L1 and L2 lines. When 80 – 340VAC or DC are put across the L1 and L2 wires the three phasing LEDs will begin to flash in sequence. If the LEDs are all green then the system power factor is greater than 0.55 and the CTs are properly placed on the corresponding voltage phases.

If two or three of the LEDs are red then there is a phasing connection error. If two LEDs are red and one is green. Switch the positions of the two CTs that are red. That should make all three LEDs green.

Using PhaseChek™

PhaseChek™ (patent pending) is a unique feature of the PowerScout™ and greatly simplifies installation and, at a glance, verifies correct CT orientation during installation. The PowerScout automatically adjusts for CT orientation—greatly reducing set-up time and all but eliminating installation errors.

If two or three of the PhaseChek™ LEDs are red, then there is a phasing connection error. If two LEDs are red and one is green, switch the positions of the two CTs that are red. That should make all three LEDs green.

If all three PhaseChek™ LEDs are red, probably the CTs are connected in the correct order but off by one position. For example, the L1 CT is on the L2 phase, the L2 CT is on the L3 phase and the L3 CT is on the L1 phase. Rotate the CTs until all of the LEDs are green thus ensuring a correct metering condition.

You can also verify that your PowerScout™ is set up correctly by using ViewPoint™. The ViewPoint™ program is designed to let you easily configure the PowerScout™ for the current transformers connected to it and to check readings. More information about ViewPoint™ can be found in Section III of this manual.

Note: If the total system power factor is less than 0.55 the LEDs will be red even if connected properly. This situation is rare but could occur if the load to be monitored is a lightly loaded electric motor, for example.

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PowerScout Modbus Commands

The Modbus commands that are used by the PowerScout meter are the Read Holding Register command, the Write (Preset) Single Register command and the Return Slave ID command. The Read Holding Register command is the most often used, as this is the command that retrieves the actual voltage, power and energy values from the meter. Typically, the RTU continually reads the values from the registers containing the desired information. The following is a quick-reference to three common Modbus commands:

Read Holding Register (Command #03; each item below is 8 bits) is as follows:							
Meter Address	**Command (03**h)	**FIRST** MSB	**FIRST** LSB	**Number to read** MSB	**Number to Read** LSB	**CRC** LSB	**CRC** MSB
Meter Address = which meter to read, FIRST = First point to read, Number to read = Number of points to read							

Write (Preset) Single Register (Command #06; each item below is 8 bits) is as follows:							
Meter Address	**Command (06**h)	**REG** MSB	**LEG** LSB	**DATA** MSB	**DATA** LSB	**CRC** LSB	**CRC** MSB
Meter Address = which meter to write, DATA = value to store							

Write Return Slave ID Command (Command #17; each item below is 8 bits) is as follows:			
Meter Address	**Command 17**h	**CRC** LSB	**CRC** MSB
Meter Address = which meter to respond			

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PowerScout Modbus Register Assignments

Table 1 is a listing of all of the data registers available on the PowerScout™. Note that following the Modbus protocol, the actual register address requested is offset from the base Modbus register by 40001.

Table 1. Modbus Register Assignments. Offset refers to a base of 40001

Register	Offset	Modbus	Detailed Description
kWh System LSW	4000	44001	System Total Net True Energy LSW (kWh)
kWh System MSW	4001	44002	System Total Net True Energy MSW (kWh)
kW System	4002	44003	System Total True Power (kW)
kW Demand System Max	4003	44004	Max Average power window (KW)
kW Demand System Now	4004	44005	Average power (KW) (most recent window)
kW System Max	4005	44006	System Maximum Instantaneous kW (Highest 500mS kW)
kW System Min	4006	44007	System Minimum Instantaneous kW (Lowest 500mS kW)
kVARh System LSW	4007	44008	System Total Net Reactive Energy LSW (kVARh)
kVARh System MSW	4008	44009	System Total Net Reactive Energy MSW (kVARh)
kVAR System	4009	44010	System Total Reactive Power (kVAR)
kVAh System LSW	4010	44011	System Total Apparent Energy LSW (kVAh)
kVAh System MSW	4011	44012	System Total Apparent Energy MSW (kVAh)
kVA System	4012	44013	System Total Apparent Power (kVA)
Displacement PF System	4013	44014	System Total Power Factor (PF)
Apparent PF System	4014	44015	System Total Power Factor (PF)
Amps System Avg	4015	44016	Total current in all phases.
Volts Line to Line Avg	4016	44017	Voltage Line to line (Volts) Average.
Volts Line to Neutral Avg	4017	44018	Voltage Line to neutral (volts) Average.
Volts L1 to L2	4018	44019	Individual Phase to Phase Voltages
Volts L2 to L3	4019	44020	
Volts L1 to L3	4020	44021	
Line Frequency	4021	44022	Line Frequency (Hz) (PS18 x 100, PS3 x 10)
kWh L1 LSW	4022	44023	Individual Phase True Energy LSW (kWh)
kWh L1 MSW	4023	44024	Individual Phase True Energy MSW (kWh)
kWh L2 LSW	4024	44025	
kWh L2 MSW	4025	44026	
kWh L3 LSW	4026	44027	
kWh L3 MSW	4027	44028	
kW L1	4028	44029	Individual Phase True Powers (kW)
kW L2	4029	44030	
kW L3	4030	44031	
kVARh L1 LSW	4031	44032	Individual Phase Reactive Energy LSW (kVARh)
kVARh L1 MSW	4032	44033	Individual Phase Reactive Energy MSW (kVARh)
kVARh L2 LSW	4033	44034	
kVARh L2 MSW	4034	44035	
kVARh L3 LSW	4035	44036	
kVARh L3 MSW	4036	44037	
kVAR L1	4037	44038	Individual Phase Reactive Powers (kVAR)
kVAR L2	4038	44039	
kVAR L3	4039	44040	

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Register (Con't)	Offset	Modbus	Detailed Description
kVAh L1 LSW	4040	44041	Individual Phase Apparent Energy LSW (kVAh)
kVAh L1 MSW	4041	44042	Individual Phase Apparent Energy MSW (kVAh)
kVAh L2 LSW	4042	44043	
kVAh L2 MSW	4043	44044	
kVAh L3 LSW	4044	44045	
kVAh L3 MSW	4045	44046	
kVA L1	4046	44047	Individual Phase Apparent Powers (kVA)
kVA L2	4047	44048	
kVA L3	4048	44049	
Displacement PF L1	4049	44050	Individual Phase displacement Power Factor (PF)
Displacement PF L2	4050	44051	
Displacement PF L3	4051	44052	
Apparent PF L1	4052	44053	Individual Phase apparent Power Factors (PF)
Apparent PF L2	4053	44054	
Apparent PF L3	4054	44055	
Amps L1	4055	44056	Individual Phase Currents (A)
Amps L2	4056	44057	
Amps L3	4057	44058	
Volts L1 to Neutral	4058	44059	Individual Phase to Neutral Voltages (V)
Volts L2 to Neutral	4059	44060	
Volts L3 to Neutral	4060	44061	
Time Since Reset LSW	4061	44062	Seconds since KWH register was reset. LSW
Time Since Reset HSW	4062	44063	Seconds since KWH register was reset. MSW
Volts Scalar (not implemented)	4064	44065	For use with step-down transformer
Amps Scalar (not implemented)	4065	44066	For use with primary CTs
Firmware Major Revision	4068	44069	
Firmware Minor Revision	4069	44070	
CT Value (x2)	4300	44301	In Amps (CT value x2)
Data Scalar	4301	44302	See Table 2
Demand Window Size	4302	44303	In Minutes (1 to 60); Default = 15 minutes

Other, Misc. Registers Settable

Register	Offset	Modbus	Detailed Description
Synchronize Register	128	40129	The multiple meters synchronization register

Other, Misc. Registers Not Settable

Register	Offset	Modbus	Detailed Description
Model Number 1st 2 bytes	4200	44201	Model Name 10 bytes (ASCII Alpha-Numeric)
Model 2	4201	44202	"
Model 3	4202	44203	"
Model 4	4203	44204	"
Model Number last 2 bytes	4204	44205	"
Serial Number 1st 2 bytes	4205	44206	Serial Number 10 bytes (ASCII Alpha-Numeric)
Serial 2	4206	44207	"
Serial 3	4207	44208	"
Serial 4	4208	44209	"
Serial Number last 2 bytes	4209	44210	"

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Interpreting the PowerScout Registers – Data Scaling

The use of Modbus protocols limits the data registers to a maximum of 2 bytes (16 bits) or a maximum decimal value of 65535. Modbus also requires that the values be integer values. To overcome these limitations some measured (and stored) values have to be scaled to fit into the Modbus registers. To convert the raw data read from the Modbus registers a scalar must be multiplied by the raw value. For this meter the scaling is:

Table 2: Data Scalar and Resolution of Modbus Values for Registers 44001 thru 44061

Register 44302	kW/kWh Demand	kVAR/kVARh	kVA/kVAh	Power Factor	Amps	Volts
0	.00001	.00001	.00001	.01	0.01 A	0.1V
1	.001	.001	.001	.01	0.1	0.1
2	.01	.01	.01	.01	0.1	0.1
3	.1	.1	.1	.01	0.1	0.1
4	1	1	1	.01	1 A	1 V
5	10	10	10	.01	1	1
≥6	100	100	100	.01	1	1

For example, if the scalar value in register 44302 is set to 3 and the total true power for the system (kW) is read from Modbus register 44003 (Offset 4002) and a value of 3465 is returned, the true system kW is 3465 X 0.1 = 346.5 kW.

A raw value of Apparent Power Factor from register 44015 might be 87. This would correspond to an actual power factor of 87 X 0.01 = .87 PF

Additionally, some values (e.g., kilowatt-hours) may cover a dynamic range that is larger than 65535 and require two Modbus registers. Any parameter in Table 1 that shows two registers (identified by the terms “MSW” and “LSW”) is such a wide-ranging parameter.

To correctly interpret the values found in these registers note that the number in the MSW (Most Significant Word) register should be multiplied first by 65536. This number should be added the value found in the corresponding LSW (Least Significant Word) register and *then* multiplied by the appropriate value from Table 2.

For example, assume that System Total True Energy (kWh) is desired and the value of 5013 is read from register 44001 (LSW) and 13 is read from register 44002 (MSW) and that the Register 44064 Scalar is set to 3.

To calculate the total kWh recorded:

Multiply the MSW by 65536 → 13 X 65536 = 851968
Add the LSW → 851968 + 5013 = 856981
Multiply by the Table 2 Scalar of 0.1 → 856981 X 0.1 = <u>85698.1 kWh</u>

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Resetting Modbus Registers

Most of the PowerScout™ registers are real-time values such as instantaneous watts or power factor. However, some registers are accumulated values such as kWh, kVARh, kVAh and various Peak Demand (kW) values. To reset the accumulating registers use the standard Modbus protocol to write a “0” to register 40001.

Modbus Implementation & Further Information

More information about Modbus can be found from Modicon in the "Modicon Modbus Protocol Reference Guide", PI-MBUS-300, Rev J. The entire document may be found at:
http://www.modicon.com/techpubs/toc7.html

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SECTION III: ViewPoint™ Software

The ViewPoint™ program is designed to let you easily configure the PowerScout™ for the current transformers connected to it and to check readings.

Installing the Software

An RS-485 to USB adapter or RS-422/485 to Serial adapter is required to connect the computer to the PowerScout™. Remove power from the PowerScout™ before installing the adapter. Refer to Section IV of this manual for safety precautions and further information regarding the RS-422/485 to Serial Adapter. After the adapter is installed apply power to the meter and proceed with installing the ViewPoint™ program.

High voltage MAY BE PRESENT. Risk of electric shock. Life threatening voltages may be present. Qualified personnel only.

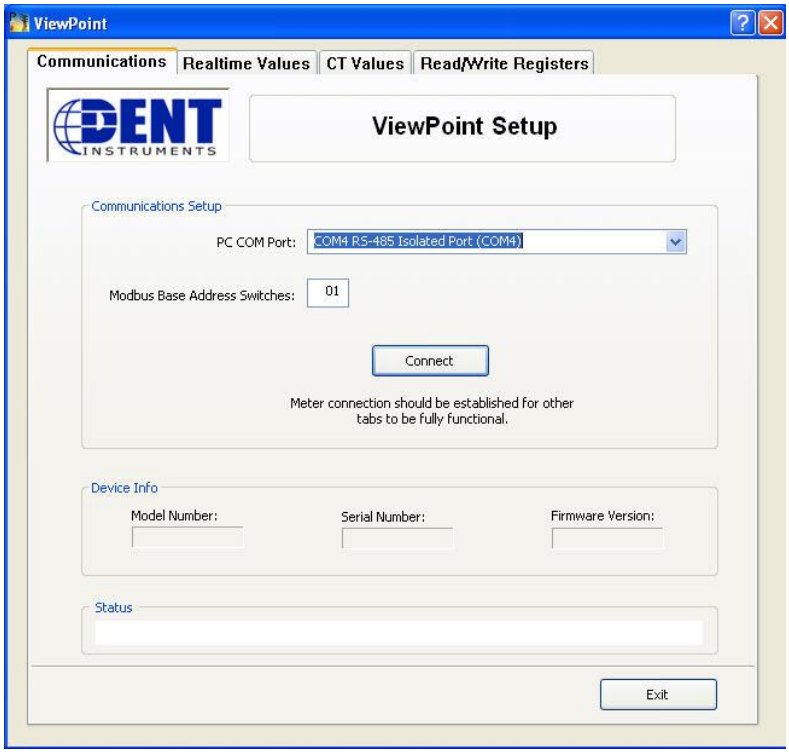
Haute tension PEUT ÊTRE PRÉSENTE. Risque de choc électrique. Tensions dangereuses peuvent être présentes. Personnel qualifié uniquement.

Step 1

If installing ViewPoint™ from the CD, insert the ViewPoint CD into the CD-ROM drive. The installer should start automatically. If it does not, browse to the CD and run the ViewPointSetup.exe program. If you have downloaded ViewPointSetup.exe, browse to its location and run it.

Step 2

After installing successfully, the ViewPoint™ program will run and will display a Communications screen with two values to fill in.



The Modbus Base Address is a hexadecimal value that should match the switches on the PowerScout™. The field is pre-configured with the default value of 01, which is how the switches are set at the factory. If that is your current configuration, then there's nothing more to do regarding the Modbus Base Address.

The PC COM Port lets you choose which serial port the computer should use to communicate with the PowerScout™ (see diagram at right). Select RS-485 from the drop-down list.

With both the Modbus Base Address and PC COM Port values entered correctly, click the Connect button to establish a connection to the PowerScout™ meter. The program will communicate with the meter and display its version information. If it could not connect, you can change the settings or the hardware connection and try again until it works.

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Step 3
Once you're communicating with the PowerScout™, you can use the other tabs in the ViewPoint™ program to configure the PowerScout™. See the next section for a description of each tab.

Using the ViewPoint Program
The program has four tabs to bring up screens for a particular task. Click a tab to bring up the desired screen. Below is a brief description of each tab:

Communications
The Communications tab lets you specify the PC COM Port and the Modbus Base Address to let the program communicate with the PowerScout™.

Real Time Values
The Real Time Values tab displays the current readings to allow you to verify that the system is configured properly. Select one of the six elements (on a PowerScout™ 18) using the radio buttons and click Update to get the values for that element.

Set CT Values
The Set CT Values tab let you change the type of current transformers connected.

Read & Write Registers
The Read & Write Registers tab allows you to view or change the value of any PowerScout™ registers. See the User's Manual for a list of the registers and their description. This tab is provided for diagnostic and special configuration purposes, and is not required for a basic setup. Select one of the six elements (on a PowerScout™ 18) using the radio buttons to choose which element to read or write to.

Help Menu
The ViewPoint™ program has a built-in Help file which you can bring up by clicking the Help button in the upper right hand corner of the window. This will open your web browser and display help for the tab currently selected in the program.

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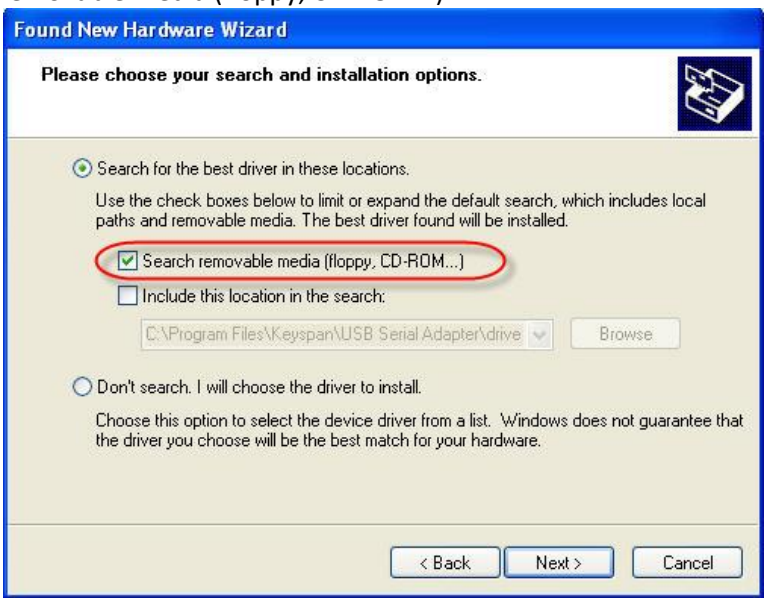
SECTION IV: RS-422/485 Adapter

Instructions for Installing the USB to RS-485 Adapter

1. Insert the B&B Electronics CD that came with the USB to RS-422/485 adapter into your PC.
2. Plug the USB to RS-422/485 adapter into a PC USB port.
3. The Found New Hardware Wizard will appear. The first screen will ask “Can Windows connect to Windows Update to search for software?”
4. Click “No, not this time,” then Next>
5. Click “Install from a list or specific location (Advanced),” Next>

Found New Hardware Wizard
Welcome to the Found New Hardware Wizard
This wizard helps you install software for:
RS-485 Isolated Port
If your hardware came with an installation CD or floppy disk, insert it now.
What do you want the wizard to do?
Install the software automatically (Recommended)
Install from a list or specific location (Advanced)
Click Next to continue.
< Back
Next >
Cancel

6. In the New Hardware Wizard select “Search for the best drivers in these locations” and “Search removable media (floppy, CD-ROM…)”.


Found New Hardware Wizard
Please choose your search and installation options.
Search for the best driver in these locations.
Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.
Search removable media (floppy, CD-ROM...)
Include this location in the search:
C:\Program Files\Keyspan\USB Serial Adapter\drive
Browse
Don't search. I will choose the driver to install.
Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.
< Back
Next >
Cancel

7. Click “NEXT>”

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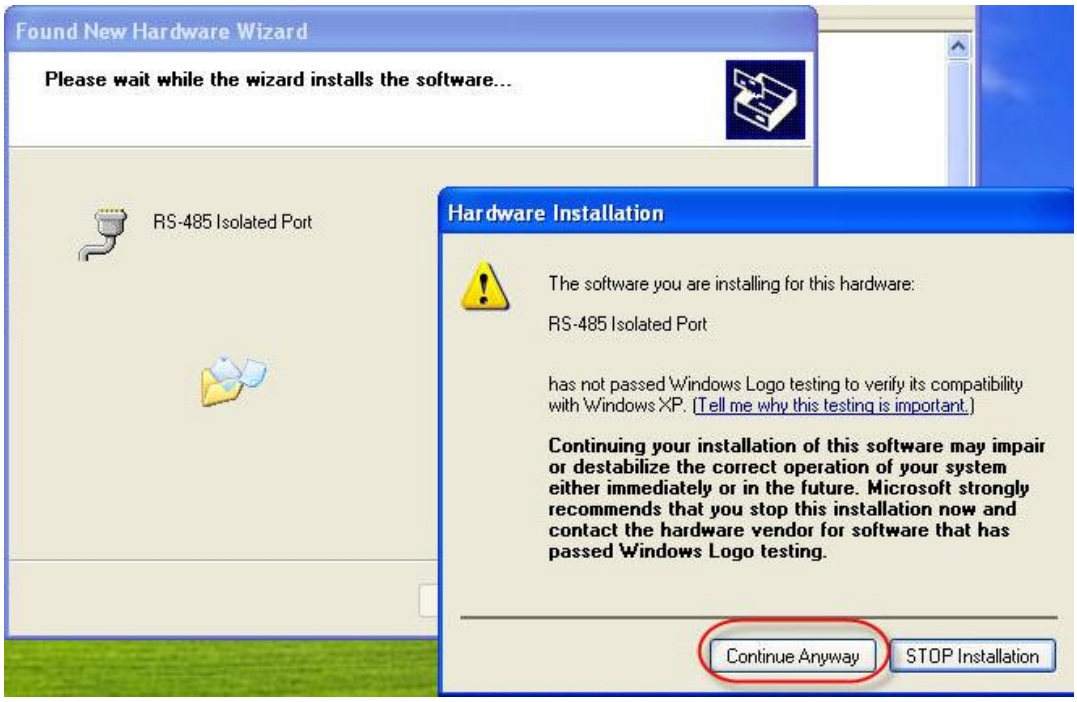
8. Ignore the Windows message about logo compatibility and click Continue anyway, and then Finish when the installation is complete.


Found New Hardware Wizard
Please wait while the wizard installs the software...
RS-485 Isolated Port
Hardware Installation
The software you are installing for this hardware:
RS-485 Isolated Port
has not passed Windows Logo testing to verify its compatibility with Windows XP. (Tell me why this testing is important.)
Continuing your installation of this software may impair or destabilize the correct operation of your system either immediately or in the future. Microsoft strongly recommends that you stop this installation now and contact the hardware vendor for software that has passed Windows Logo testing.
Continue Anyway
STOP Installation

9. The New Hardware Wizard will come up a second time in order to install the serial port. Repeat steps 4-8.
10. When the "Completing the Found New Hardware Wizard" is displayed, remove the CD from your computer and store.
11. Verify that the dip switches on the back of the USB to RS-422/485 adapter are set to: RS-422/485, Echo Off, 2 Wire, 2 Wire
12. The adapter is now ready for use.

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SECTION V: APPENDIX

APPENDIX A: HEXIDECIMAL to DECIMAL CONVERSION

Table A1: Decimal Value is the Modbus Meter Address. Hex Value Corresponds to the Two Rotary Switch Settings. (Left switch is high digit, Right switch is low digit)

Decimal	Hex	Decimal	Hex	Decimal	Hex	Decimal	Hex	Decimal	Hex	Decimal	Hex
1	---	44	2C	87	57	130	82	173	AD	216	D8
2	02	45	2D	88	58	131	83	174	AE	217	D9
3	03	46	2E	89	59	132	84	175	AF	218	DA
4	04	47	2F	90	5A	133	85	176	B0	219	DB
5	05	48	30	91	5B	134	86	177	B1	220	DC
6	06	49	31	92	5C	135	87	178	B2	221	DD
7	07	50	32	93	5D	136	88	179	B3	222	DE
8	08	51	33	94	5E	137	89	180	B4	223	DF
9	09	52	34	95	5F	138	8A	181	B5	224	E0
10	0A	53	35	96	60	139	8B	182	B6	225	E1
11	0B	54	36	97	61	140	8C	183	B7	226	E2
12	0C	55	37	98	62	141	8D	184	B8	227	E3
13	0D	56	38	99	63	142	8E	185	B9	228	E4
14	0E	57	39	100	64	143	8F	186	BA	229	E5
15	0F	58	3A	101	65	144	90	187	BB	230	E6
16	10	59	3B	102	66	145	91	188	BC	231	E7
17	11	60	3C	103	67	146	92	189	BD	232	E8
18	12	61	3D	104	68	147	93	190	BE	233	E9
19	13	62	3E	105	69	148	94	191	BF	234	EA
20	14	63	3F	106	6A	149	95	192	C0	235	EB
21	15	64	40	107	6B	150	96	193	C1	236	EC
22	16	65	41	108	6C	151	97	194	C2	237	ED
23	17	66	42	109	6D	152	98	195	C3	238	EE
24	18	67	43	110	6E	153	99	196	C4	239	EF
25	19	68	44	111	6F	154	9A	197	C5	240	F0
26	1A	69	45	112	70	155	9B	198	C6	241	F1
27	1B	70	46	113	71	156	9C	199	C7	242	F2
28	1C	71	47	114	72	157	9D	200	C8	243	F3
29	1D	72	48	115	73	158	9E	201	C9	244	F4
30	1E	73	49	116	74	159	9F	202	CA	245	F5
31	1F	74	4A	117	75	160	A0	203	CB	246	F6
32	20	75	4B	118	76	161	A1	204	CC	247	F7
33	21	76	4C	119	77	162	A2	205	CD	248	F8
34	22	77	4D	120	78	163	A3	206	CE	249	F9
35	23	78	4E	121	79	164	A4	207	CF	250	FA
36	24	79	4F	122	7A	165	A5	208	D0	251	FB
37	25	80	50	123	7B	166	A6	209	D1	252	FC
38	26	81	51	124	7C	167	A7	210	D2	253	FD
39	27	82	52	125	7D	168	A8	211	D3	254	FE
40	28	83	53	126	7E	169	A9	212	D4	255	---
41	29	84	54	127	7F	170	AA	213	D5		
42	2A	85	55	128	80	171	AB	214	D6		
43	2B	86	56	129	81	172	AC	215	D7		

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APPENDIX B: VERIS H8035/H8036 EMULATION

The PowerScout™ meter can be used as a direct replacement for the Veris, Inc. H8035/H8036 Series of networked power meters. This mirroring of the Veris Modbus register assignments makes replacement with a PowerScout™ simple. However, because the number of parameters that the Veris meters measure is less than half of what the PowerScout™ can measure, the other Modbus registers described in Table 1 need to be used if the additional capabilities of the PowerScout™ are desired.

Table B1: Veris Emulation Modbus Register Assignments*

Modbus Addr.	Offset	Description	Units	Comments
40001		System Total True Energy, LSW	kWh	Multiplier Required, Resetable
40002		System Total True Energy, MSW	kWh	Multiplier Required, Resetable
40003		System Total True Power	kW	Multiplier Required
40004		System Total Reactive Power	kVAR	Multiplier Required
40005		System Total Apparent Power	kVA	Multiplier Required
40006		System Total Apparent Power Factor	PF	Multiplier Required
40007		Average Line to Line Voltage	Volts	Multiplier Required
40008		Average Line to Neutral Voltage	Volts	Multiplier Required
40009		Sum of Line Currents	Amps, X1	Multiplier Required
40010		L1 Phase True Power	kW	Multiplier Required
40011		L2 Phase True Power	kW	Multiplier Required
40012		L3 Phase True Power	kW	Multiplier Required
40013		L1 Phase Apparent Power Factor	aPF	Multiplier Required
40014		L2 Phase Apparent Power Factor	aPF	Multiplier Required
40015		L3 Phase Apparent Power Factor	aPF	Multiplier Required
40016		L1 – L2 Voltage	Volts	Multiplier Required
40017		L2 – L3 Voltage	Volts	Multiplier Required
40018		L3 – L1 Voltage	Volts	Multiplier Required
40019		L1 – Neutral Voltage	Volts	Multiplier Required
40020		L2 – Neutral Voltage	Volts	Multiplier Required
40021		L3 – Neutral Voltage	Volts	Multiplier Required
40022		L1 Current	Amps	Multiplier Required
40023		L2 Current	Amps	Multiplier Required
40024		L3 Current	Amps	Multiplier Required
40025		System Average Demand	kW	Multiplier Required Variable Window, Resetable
40026		System Minimum Inst. Demand	kW	Multiplier Required, 500mS
40027		System Maximum Inst. Demand	kW	Multiplier Required, 500mS

*All values are 16 bit, unsigned integers. The PowerScout™ does not currently support the Veris floating point registers. Consult DENT Instruments for availability.

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Table B2. Veris Multipliers for Integer Registers 40001 - 40027

Address	Units	≤100A	101 - 400A	401 – 800A	801 - 1600A	1601 - 32,000A
40001	KWH LSB	7.8125exp-3	0.03125	0.0625	.125	0.25
40002	KWH MSB	512	2048	4096	8192	16384
40003	KW	0.004	0.016	0.032	0.064	0.128
40004	KVAR	0.004	0.016	0.032	0.064	0.128
40005	KVA	0.004	0.016	0.032	0.064	0.128
40006	aPF	3.0518exp-5	3.0518exp-5	3.0518exp-5	3.0518exp-5	3.0518exp-5
40007	VOLTS L-L	0.03125	0.03125	0.03125	0.03125	0.03125
40008	VOLTS L-L	0.015625	0.015625	0.015625	0.015625	0.015625
40009	AMPS	3.9063exp-3	0.015625	0.03125	0.0625	0.125
40010	KW L1	0.001	0.004	0.008	0.016	0.032
40011	KW L2	0.001	0.004	0.008	0.016	0.032
40012	KW L3	0.001	0.004	0.008	0.016	0.032
40013	aPF L1	3.0518exp-5	3.0518exp-5	3.0518exp-5	3.0518exp-5	3.0518exp-5
40014	aPF L2	3.0518exp-5	3.0518exp-5	3.0518exp-5	3.0518exp-5	3.0518exp-5
40015	aPF L3	3.0518exp-5	3.0518exp-5	3.0518exp-5	3.0518exp-5	3.0518exp-5
40016	VOLTS L1-L2	0.03125	0.03125	0.03125	0.03125	0.03125
40017	VOLTS L2-L3	0.03125	0.03125	0.03125	0.03125	0.03125
40018	VOLTS L3-L1	0.03125	0.03125	0.03125	0.03125	0.03125
40019	VOLTS L1-N	0.015625	0.015625	0.015625	0.015625	0.015625
40020	VOLTS L2-N	0.015625	0.015625	0.015625	0.015625	0.015625
40021	VOLTS L3-N	0.015625	0.015625	0.015625	0.015625	0.015625
40022	AMPS L1	3.9063exp-3	0.015625	0.03125	0.0625	0.125
40023	AMPS L2	3.9063exp-3	0.015625	0.03125	0.0625	0.125
40024	AMPS L3	3.9063exp-3	0.015625	0.03125	0.0625	0.125
40025	KW	0.004	0.016	0.032	0.064	0.128
40026	KW	0.004	0.016	0.032	0.064	0.128
40027	KW	0.004	0.016	0.032	0.064	0.128

Per the Veris implementation, to obtain true engineering units, the values returned from the registers in Table B1 must be multiplied by the scaling value found in Table B2. For example, if the PowerScout™ has 100A CTs connected to it, then to get system reactive power (kVARs) multiply the value returned from reading register 40004 by 0.004.

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